Outcome of Subscapularis release and Latissimus dorsi transfer to Infraspinatus in children with obstetric brachial plexus palsy: A retrospective Cohort study.

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ABSTRACT

Objective: To determine the functional outcome of Subscapularis release and Latissimus dorsi transfer to Infraspinatus in children with obstetric brachial plexus palsy.

Methods: This retrospective Cohort study was conducted in National Orthopaedic and General Hospital Bahawalpur and Orthopaedic unit Lady Reading Hospital Peshawar.The records of all children of obstetric brachial plexus palsy fulfilling the inclusion criteria and operated with Subscapularis release and Latissimus dorsi transfer to Infraspinatus in time period extending from 25th January 2016 to 25th December 2020 were reviewed.Functional outcome was assessed by comparing pre-operative and post operative shoulder abduction and external rotation and *P* value was calculated with Chi-square test(*P* value <0.05 was considered significant).

Results: We operated 19 children of obstetric brachial plexus palsy with Subscapularis release and Latissimus dorsi transfer to Infraspinatus.Male children were 13(68.42%) and female 6(31.5%).The mean follow-up was 9.78±2.48 months. Right side was involved in 11(57.89%) patients and left in 8(42.1%).Preoperatively mean external rotation was -12.63°±7.5 and abduction 65°±14.24 All patients showed significant improvement in shoulder range of motion with postoperative mean external rotation 50.78°±9.46 and abduction 117.63°±13.37(*P* value <0.05).

Conclusion: Subscapularis release and Latissimus dorsi transfer to Infraspinatus is a good surgical technique with excellent functional outcome. We recommend this technique in children with obstetric brachial plexus palsy without spontaneous recovery.

Keywords: Brachial plexus,Infraspinatus, Latissimus dorsi, Obstetric, Shoulder, Subscapularis.

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INTRODUCTION

The incidence of obstetric brachial plexue palsy is 0.9 per 1,000 live births.[1] There are many risk factors for for brachial plexus palsy.These include multiparous pregnancy,maternal diabetes,large size for gestational age, prolonged labor, breech delivery, shoulder dystocia, assisted vacuum or forceps delivery and previous deliveries resulting in brachial plexus birth palsy.[2] Although brachial plexus birth palsy commonaly involves the upper trunk (C5-6), combination with C7 injury or pan plexus(C5-T1) injuryis also reported with variable frequency.[3] Injuries can be neuropraxia due to mechanical stretch or axonotemsis due to nerve root rupture and avulsion.[4] Patients with ipsilateral ptosis, miosis and anhydrosis(Horner's syndrome) indicate an avulsion of the lower nerve roots.[5] Fortunately neuroprexia occurs in majority of patients which recovers spontaneously without any intervention.[6] When

sufficient spontaneous recovery does not occur then nerve surgery preferably at the age of 3 to 9 months is required.[7-10]

The muscle imbalance of shoulder due to obstetric brachial plexus injury results in anatomical changes in glenohumeral joint with limitation of abduction , external rotation and development of internal rotation contracture.[11,12] Various treatments stratagies for obstetric brachilal plexus palsy have been reported in literature with variable results.With nerve repair and physiotherapy there is limited recovery of shoulder abduction and external rotation and anatomical changes in the glenohumeral joint occured which are corrected with secondary surgeries in the form of Subscapularis and Pectoralis Major release for internal rotation contracture, release and/or Latissimus dorsi and teres major transfer to infraspinatus and later on humeral derotation osteotomy for older patients with advanced deformity of glenohumeral joint.[13]

Internal rotation contracture in birth palsy results in functional limitation and affects daily activities of the patient. Subscapularis release and latissimus Dorsi transfer to infraspinatus significantly improve external rotation and abduction.[14]

The objective of our study was to determine the functional outcome of Subscapularis release and Latissimus dorsi transfer to Infraspinatus in children with obstetric brachial plexus palsy.

METHODS

We conducted this this retrospective Cohort study in National Orthopaedic and General Hospital Bahawalpur and Orthopaedic unit Lady Reading Hospital Peshawar.The records of all children of obstetric brachial plexus palsy who were operated with Subscapularis release and Latissimus dorsi transfer to Infraspinatus in time period extending from 25th January 2016 to 25th December 2020 were reviewed. Inclusion criteria were confirmed cases of obstetric brachial plexus palsy with no spontaneous recovery and internal rotation contracture of the shoulder with defective abduction.Children with incomplete records,incomplete follow up and those with previous surgeries for obstetric brachial plexus palsy were excluded.The study protocols were approved by the Ethical Committes of the two hospitals. All patients had Subscapularis release and Latissimus dorsi transfer to Infraspinatus by the same surgical team following a uniform standard surgical technique described below.

Surgical technique

Surgery was performed under general anesthesia in supine position. The affected shoulder and trunk was prepared up to the midline anteriorly and posteriorly. Arm was abducted and the first incision was given along posterior axillary fold extending into axilla. Dissection was done to expose Latismus dorsi and Teres major. Latissimus dorsi was separated from Teres major and Latissimus dorsi released from its attachment on humerus taking care not to damage neurovascular bundle.Crackow stich was taken in Latissimus dorsi with prolene 2/0.A window was made between circumflex scapular and circumflex humeral artery for release of subscapularis.Arm was maximally externally rotated and subscapularis was released from its attachment on tuberosity of humerus.

A second incision was given along posterior border of deltoid.Deltoid was retracted above to expose infraspinatus.Through interval between posteroinferior margins of the deltoid and rotator cuff Latissimus dorsi was transferred to Infraspinatus and stiched as superior as possible with arm in abduction and external rotation.Haemostasis was secured and wound was closed.Abduction splint applied after dressing which remained for 6 to 8 weeks.(Fig.I-IV).


Fig. I-IV: Per operative and immediate post operative pictures of Latissimus dorsi Transfer to Infraspinatus and Abduction Brace.

Fig. V: Functional outcome of Subscapularis release and Latissimus dorsi transfer

The first follow up visit was scheduled at 2 weeks after surgery for wound examination and stitch removal followed by second visit at 6th and 8th weeks after surgery. The patient was immobilized in in shoulder abduction external rotation brace for 8 weeks followed by range of motion exercises.(Fig.V).

Data was analyzed using SPSS version 22.Descriptive statastics were used to calculate mean and standard deviation for quantative variables while frequency and percentage for qualitative variables. Preoperative and postoperative shoulder abduction and external rotation was compared and *P* value calculated with Chi-square test. P value <0.05 was taken as significant.

RESULTS

We reviewed the medical record of 19 children of obstetric brachial plexus palsy who were operated for Subscapularis release and Latissimus dorsi transfer to Infraspinatus.The mean age was 6.61± 3.7 years (range 1.2 to 15 years). Majority (68.42%, n=13) were male while female were 6(31.5%). Right sided obstetric brachial plexus palsy was present in 11(57.89%) patients and left in 8(42.1%). The mean follow-up duration was 9.78 ±2.48 months (range 5 to12 months). Preoperatively mean external rotation was -12.63°±7.5 (range -25° to 0°) and abduction 65°±14.24 (range 40° to 90°) All patients showed significant improvement in shoulder range of motion with postoperative mean external rotation 50.78°±9.46 (range 35° to 70°) and abduction 117.63°±13.37. (range 90° to 140°). The *P* value was <0.05.Although unequal distribution but no statistically significant difference was noted in functional outcome when comarision was made for age, gender and side. (*P* value ≥0.05). No major complication was noted.

DISCUSSION

Traditionally isolated release of the Subscapularis insertion has been used to treat internal rotation contractures in children with obstetric brachial plexus palsy. Newman[15] achieved satisfactory results with Subscapularis release alone with active external rotation of 49° and active abduction of 30°.However, Cohen[14] in his study concluded that without tendon transfers an isolated release had poor results.Cohen achieved 62° external rotation and 15° abduction with Subscapularis release and Latissimus dorsi transfer to Infraspinatus which is comparable to our

results. Abdel-Ghani[16] displayed significant improvement of active shoulder abduction and external rotation from pre-op 91° and -2° to post op 153° and 96° respectively. In another study by Khira[17] the mean shoulder abduction in all patients improved from 85.9°±18.9 to 132.0°±18.7 and mean shoulder external rotation from –17.9°±16.6 to 66.5°±14.9.Werthel and colleagues[18] shows satisfactory results in their study with shoulder abduction and external rotation (arms by the side) improved by 40 ° and 48 ° respectively. The pre operative abduction in our series was 65°±14.24.Aydin[19] in his series of 46 children of obstetric brachila plexus palsy treated with Subscapularis release and Latissimus dorsi transfer to Infraspinatus documented that patients with pre operative abduction less than 90° had better functional outcome postoperatively than those with more than 90° pre op abduction.

Hultgren[20] treated 270 children and reported improvement in external rotation upto 84.6% and Mallet score of 4.Hultgren however concluded that addition of Latissimus dorsi transfer was not associated with improvement of external rotation when compared with subscapularis release alone.

This procedure is not without complications. Pagnotta[21] demonstrated deterioration of shoulder abduction at 6 years despite preserved active external rotation.Contrary to Pagnotta, Werthel[18] reported deteriation of external rotation at 7 years follow up.Since our follow up was short therefore we could not documented such complications in our series.

The limitations of our study are the retrospective design, small sample size and short follow up. We recommend that further studies should be conducted with a larger sample size and longer follow up comparing the results of different techniques of treatment of obstetric brachial plexus palsy.

CONCLUSION

Subscapularis release and Latissimus dorsi transfer to Infraspinatus is a good surgical technique with excellent functional outcome. We recommend this technique in children with obstetric brachial plexus palsy without spontaneous recovery.The functional disability of obstetric brachial plexuspalsy warrants early recognition and appropriate treatment.A through physical assessment of the child and concern for expectation of the parents and realistic achievement of goals are however of paramount importance prior to commencing treatment.

Conflict of Interest: None
Grants/Funding: None

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